

WHAT IS CLAIMED IS

Patent Claims

1. A method for improved data transmission and for efficient use of multi-level modulation methods which employ orthogonal basis functions to represent a signal to be transmitted, characterized in that signal points having a defined signal energy of a signal constellation are selected according to set and/or selected probabilities in order to optimize the signal energy and/or data rate.
2. The method as recited in Claim 1, characterized in that source coding methods, such as the known Huffman method, are employed for adapting data sequences for the purpose of using orthogonal methods.
3. The method as recited in one of Claims 1 or 2, characterized in that, for protection against transmission errors, use is made of an error-correcting code, adapted to the modulation method and channel, whose error detection characters are inserted with the aid of a second data source (1').
4. The method as recited in Claim 3, characterized in that the error-correcting code is a block code.
5. The method as recited in Claim 3, characterized in that the error-correcting code is a convolution code.
6. The method as recited in Claim 4, characterized in that the block code is a code over Gaussian integers modulo a Gaussian number.
7. The method as recited in Claim 4,

characterized in that the block code is a code over Eisenstein-Jacobi integers modulo an Eisenstein-Jacobi number.

8. The method as recited in one of Claims 1 through 7, characterized in that the input data stream is encrypted.
9. A circuit arrangement for implementing the method for improved data transmission with the aid of orthogonal functions, characterized in that, downstream of a data source (1) for a data stream (2) is a recoder (3) whose output is connected to a modulator (4) for selection of the corresponding signal points with the correct probability; the output of the modulator (4) is connected to the input of a channel (5) whose output is connected to the input of a demodulator (6) which is followed by an inverse coder (7) for executing the operation inverse to that of the coder (3); and the output of this coder (7) is connected to a sink (8) for the data stream (2).
10. The circuit arrangement for implementing the method for improved data transmission with the aid of orthogonal functions as recited in one of Claims 1 through 8, characterized in that provision is made for a temporary storage with a control/processing unit (9) which can cause the recoder (3') to switch between at least two recoding tables such that there is no storage overflow, combined with the corresponding inverse devices (8' and 9') on the receiver and data-sink sides.
11. The circuit arrangement as recited in one of Claims 9 or 10 for implementing the method for improved data transmission with the aid of orthogonal functions, characterized in that the output of the modulator (4) is connected in buffered

manner to the input of the channel (5), in particular via a temporary register or a buffer.

12. The circuit arrangement as recited in Claims 9, 10 or 11, characterized in that a second data source (1') supplies the temporary storage with additional data which are either user, synchronization or check data.
13. A method according to Claim 1 for operating a circuit arrangement as recited in one of Claims 9 or 10, characterized in that the channel data rate is selected to be greater than the source data rate.
14. The method as recited in Claims 1 and 13, respectively, characterized in that if no source bits are present at the circuit, synchronization data are transmitted.
15. The method as recited in Claims 1 and 13, respectively, characterized in that if no source bits are present at the circuit, other housekeeping or user data are transmitted.

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